

Claims:

1. A hunting detecting device for an electrical load  
controlling device, wherein the electrical load controlling  
5 device sets a current command value for an electrical load,  
wherein, based on a deviation between a current that actually  
flows through the electrical load and the current command  
value, the electrical load controlling device performs at  
least proportional control in a group including proportional  
10 control, integral control, and differential control, wherein  
the electrical load controlling device sends a current  
generated based on the performed control to the electrical  
load, the hunting detecting device comprising:

a current determining device, which determines whether  
15 there is a current through the electrical load; and

a hunting detector, wherein, when the current determining  
device determines that there is a current through the  
electrical load, the hunting detector detects the number of  
times of hunting occurs within a predetermined period.

20 2. The hunting detecting device according to claim 1,  
wherein the hunting detector includes:

a duty ratio determining device for determining whether a  
duty ratio related to the current is less than a predetermined  
25 threshold value; and

a counter device, which accumulates the number of times  
the duty ratio determining device determines that the duty  
ratio is less than the predetermined threshold value.

30 3. The hunting detecting device according to claim 2,  
further comprising an abnormality determining device,  
wherein, when the cumulative number accumulated by the counter  
device is at least an abnormality determination value, the  
abnormality determining device determines that there is an  
35 abnormality.

4. A short circuit detecting device for an electrical load controlling device, having the hunting detecting device according to claim 1, the short circuit detecting device  
5 further comprising:

a short circuit determining device, wherein, when the number of times of hunting exceeds a predetermined number, the short circuit determining device determines that there is a short circuit in the electrical load.

10 5. A short circuit detecting device for an electrical load controlling device, having the hunting detecting device according to claim 2, the short circuit detecting device further comprising:

15 a short circuit determining device, wherein, when the number of times accumulated by the counter device is at least a predetermined number, the short circuit determining device determines that there is a short circuit in the electrical load.

20 6. The short circuit detecting device according to claim 4:

wherein the short circuit detecting device includes an electrical power source, a relay device, and a relay  
25 controlling device, wherein the electrical load is connected to the electrical power source with the relay device, and wherein, when the short circuit determining device determines that there is a short circuit in the electrical load, the relay controlling device turns off the relay device.

30 7. The short circuit detecting device for an electrical load controlling device according to claim 4, further comprising a warning device, wherein, when the short circuit determining device determines that there is a short circuit in  
35 the electrical load, the warning device warns of existence of

the short circuit.

8. A driving force distribution controlling device having the short circuit detecting device according to claim 4,  
5 wherein the driving force distribution controlling device controls a driving force distributing device that adjusts a ratio of driving force that is distributed from a power source of a vehicle to front wheels and rear wheels of the vehicle via a driving force transmitting system,

10 wherein the driving force distributing device includes an electrical load for adjusting the ratio of the driving force; and

wherein the driving force distribution controlling device functions as the electrical load controlling device.

15 9. A hunting detecting method for controlling a current through an electrical load, comprising: setting a current command value for the current through the electrical load; sending a current to the electrical load; detecting the  
20 current actually flowing through the electrical load; and performing control of the current based on a deviation between the detected current and the current command value, wherein the control is selected from a group including proportional control, the combination of proportional control and integral  
25 control, the combination of proportional control and differential control, and the combination of proportional control integral control, and differential control , the ' method further comprising:

a step for determining whether there is a current through  
30 the electrical load; and

a step for detecting the number of times hunting occurs within a predetermined period when it is determined that there is a current through the electrical load.

35 10. The hunting detecting method according to claim 9,

wherein the step for detecting the number of times hunting occurs includes:

5 a determining step for determining whether a duty ratio related to the current is less than a predetermined threshold value; and

a counting step for accumulating the number of times that the determining step determines that the duty ratio is less than the threshold value.

10 11. The hunting detecting method according to claim 9, further comprising:

15 a short circuit determining step, wherein, when the number of times hunting occurs exceeds a predetermined number, it is determined that there is a short circuit in the electrical load.

12. The hunting detecting method according to claim 10, further comprising:

20 a short circuit determining step, wherein, when the cumulative number in the counting step exceeds a predetermined number, it is determined that there is a short circuit in the electrical load.

25 13. A driving force distribution controlling device for a four wheel drive vehicle, wherein the driving force distribution controlling device controls an inductive load circuit that adjusts a ratio of driving force that is distributed from a power source to a plurality of wheels via a driving force transmitting system, the driving force distribution controlling device comprising:

a detecting device for detecting a current through the inductive load circuit;

35 a first timer device for measuring a period required for a counter electromotive current, which is generated in the inductive load circuit after the vehicle is stopped, to

vanish;

a test current outputting device, wherein after the first timer device completes measuring, the test current outputting device outputs a test current to the inductive load circuit;

5 a counting device, wherein, while the test current is being outputted, the counting device counts the number of times the current detected by the detecting device exceeds a first threshold value; and

10 a short circuit determining device, wherein, when the number of times the detected current exceeds the first threshold value is at least a predetermined second threshold value, the short circuit determining device determines that there is a short circuit in the inductive load circuit.

15 14. The driving force distribution controlling device for a four wheel drive vehicle according to claim 13, further comprising a second timer device for measuring a period during which the test current is outputted, and wherein, when the period measured by the second timer device reaches a  
20 predetermined period, the test current outputting device stops outputting the test current.

15. The driving force distribution controlling device for a four wheel drive vehicle according to claim 13, wherein,  
25 based on the determination result of the short circuit determining device, the amount of current supplied to the inductive load circuit is set in accordance with a two wheel drive mode.

30 16. The driving force distribution controlling device for a four wheel drive vehicle according to claim 13, further comprising:

a vehicle stop determining device for determining whether the vehicle is in a stopped state based on a control  
35 parameter;

wherein the first timer device starts operation based on the determination result of the vehicle stop determining device.

5           17. The driving force distribution controlling device for a four wheel drive vehicle according to claim 16, wherein the control parameter is a wheel speed parameter and a throttle opening degree parameter.

10           18. The driving force distribution controlling device for a four wheel drive vehicle according to claim 16,

          wherein the inductive load circuit is driven based on a command current; and

          wherein the control parameter is the command current and  
15       a wheel speed parameter.

          19. The driving force distribution controlling device for a four wheel drive vehicle according to claim 13, wherein the driving force transmitting system includes an electromagnetic  
20       clutch mechanism.

          20. The driving force distribution controlling device for a four wheel drive vehicle according to claim 19, wherein the driving force transmitting device includes an electromagnetic  
25       solenoid for controlling the electromagnetic clutch mechanism, and wherein the electromagnetic solenoid forms the inductive load circuit.

          21. The driving force distribution controlling device for  
30       a four wheel drive vehicle according to claim 19, wherein a shunt resistor is connected between the electromagnetic solenoid and the detecting device, and wherein the detecting device detects a current through the electromagnetic solenoid by detecting a current through the shunt resistor.